ART. X.—*Notes on Miocene Strata at Jemmy's Point, with brief remarks upon the Older Tertiary at Bairnsdale.*

(With Diagram.)

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[Read October 9, 1890.]

At various times, shells have been obtained at Jemmy's Point, but no particular attention was paid to them until a year or two ago, when Mr. Gregson, Land Officer at Bairnsdale, sent a number of species to Professor Tate for identification. Amongst many well known forms, of frequent occurrence in other portions of our tertiaries in Victoria, South Australia, and Tasmania, there were also several new species. The material forwarded indicated that the deposit probably belonged to the upper division of the tertiaries, but the determination of its exact position in the series required not only a fuller collection, but also a careful examination of the strata. It was, therefore, proposed by Professor Tate, when in Melbourne at the beginning of the year, that I should accompany him on a visit to Bairnsdale and Jemmy's Point; and with the welcome addition to our party of Messrs. Sayce and Pritchard, we succeeded in making an enjoyable, as well as a profitable, excursion to these localities. At the request of Professor Tate, I have undertaken to give the results of our researches.

I may say at the outset, that I do not pretend to discuss the general geology of the neighbourhood, our time having been fully taken up in collecting at the fossiliferous sections indicated to us by Mr. Gregson. Some interesting problems connected with the underlying and overlying strata presented themselves, but our stay was too brief to allow of their being fully studied, and they may well be left for local geologists to work out.

On the geological map of the colony, the Jemmy's Point beds are noted as of Miocene age, which is undoubtedly correct. The beds at Bairnsdale, however, are also given as Miocene, but as they are wholly distinct from those at Jemmy's Point, having scarcely a shell in common, it is difficult to see how they can belong to the same geological formation. In some remarks to be made later on, upon these beds, their relative position in the tertiary series will be considered.

On the accompanying locality map, the situation of those sections at Jemmy's Point, which we examined, is shewn. They are all on, or close to, the northern margin of the Reeves River, opposite Rigby, Fraser, and Flannagan Islands, and thus not far from the new Lakes' Entrance. An outcrop, three miles inland, is known to Mr. Gregson, but this we had not time to visit.

At "The Narrows," the fossiliferous strata crop out on the shore line, and extend for a few feet up the side of the bank. A section about three-quarters of a mile inland, on the line of a timber tramway near the Ti Tree Swamp, is slightly but not much higher, and at the horse shoe indentation, opposite Flannagan Island, the fossils were found from the margin of the river up to about forty or fifty feet on the bank.

These are all the outcrops we saw, but I think it highly probable that there are others, both along the shores of Reeves River from Lake King to Jemmy's Point, as well as for a short distance inland. At all the sections, except that at the Ti Tree Creek, blocks of flaggy sandstone were observed, either above or below the fossil beds; and what looked like the same strata shewed a good distance up, on the side of a hill between Jemmy's Point and Flannagan Islands. When in "The Narrows," I concluded that the fossils lay beneath the sandstone, but at the "Horse Shoe," the latter appeared to be inter-stratified with the fossiliferous deposit. I cannot, however, affirm that such is the case, as possibly the *apparent* superior position of the fossils in one part of the section may be otherwise explained.

The bank on the north side of Reeves River reaches to a height of from 150 to 300 feet, and is evidently the old coast line. The islands in the channel are flat and marshy, while the narrow strip of land, which alone separates the river from the ocean, consists principally of low sand dunes. The present coast features are, no doubt, due to the gradual

elevation of the land, the lakes and rivers, (or rather channels as they should be called) being simply formed by the banking back of the water by drift sand from the beach. At a period not very remote, the sea must certainly have washed the northern shore of Reeves River, and also the inland boundary of the Gippsland coast lakes.

The fossils are generally found in a light-colored calcareous sand, which in the "The Narrows" is mixed with clay at the bottom of the bank. In a few places, the shells form a whitish, friable limestone, in which it is rare to get a perfect specimen. Everywhere, indeed, though the shells are abundant, they are fragile, and it requires patience as well as labour to gather a good variety of species. Strong shells, such as *Pectunculus cainozoicus, Leda crassa, Trigonia howitti, Pelicaria coronata, &c.*, are not only numerous, but also frequently perfect; the thin delicate shells are often broken, and a whole one, when found, is at once carefully packed in cotton wool as a prize by the collector.

In the following catalogue, the names and distribution of the fossils collected by our party at Jemmy's Point are supplied. The identifications are by Professor Tate, who has aided me in the palæontological portion of my task in the most liberal manner. Duplicates of all the new species are in his hands, and a description of them is to be published shortly.

The total number of species is 116, viz., Gasteropoda 59, Scaphopoda 1, Lamellibranchiata 47, Brachiopoda 1, Polyzoa 2, Cirripedia 2, Echinodermata 1, and Zoantharia 3.

Species found in Jemmy's Point Beds.	Eocene			Miocene.		Plio-cene.	Locality Where Living, and Remarks.
	Lower Beds Muddy Creek.	Schnapper Pt.	S. Australia.	Upper Beds. Muddy Creek.	S. Australia.	Limestone Creek, Glenelg.	
Gasteropoda.							
Typhis sp.	..	..	..	..	..	..	New species.
Cominella clelandi (Tate)	..	..	..	..	§	..	
Triton sp.	..	..	..	..	..	..	New species (*aff.* T. ovoideus).
Fusus gippslandicus (Tate)	..	..	..	..	..	..	
Peristernia approximans (Tate)	..	..	..	§	§	..	
Fasciolaria sp.	..	..	..	..	..	..	(*aff.* F. rugata).
Eburnopsis sp.	..	..	..	..	..	..	New species.
Phos gregsoni (Tate)	..	..	..	..	..	..	
Nassa sublirella (Tate)	..	..	..	§ §	..	..	
Nassa crassigranosa (Tate)	..	..	..	§ §	..	..	
Nassa labecula (Adams)	..	..	..	..	..	..	Living in Temperate Australia.
Voluta sp.	..	..	..	..	..	..	New species (*aff.* V. undulata).
Mitra euglypha (Tate)	..	..	..	..	..	..	
Mitra terebræformis (Tate)	..	§	..	§	..	..	
Marginella tuberculosa (Tate) m.s.	..	..	..	..	..	..	New species.
Marginella crassidens (Tate) m.s.	..	..	..	..	..	..	New species.
Marginella hordeacea (Tate)	..	..	..	..	§	..	
Oliva nymphalis (Tate)	..	..	..	§	..	..	
Ancillaria oryeta (Tate)	..	..	..	..	§	..	Fossil also at Cheltenham.
Columbella simplex (Tate) m.s.	..	..	..	§	..	..	
Cancellaria wannonensis (Tate)	..	..	..	§	§	..	
Terebra subcatenifera (Tate)	..	..	..	..	..	..	
Terebra sp.	..	..	..	..	..	..	New species (*aff.* T. tristis).

Species found in Jemmy's Point Beds.	Eocene. Lower Beds Muddy Creek.	Eocene. Schnapper Pt.	Eocene. S. Australia.	Miocene. Upper Beds Muddy Creek.	Miocene. S. Australia.	Plio-cene. Limestone Creek, Glenelg.	Locality where Living, and Remarks.
Gasteropoda—*Continued.*							
Terebra simplex (T. Woods)	§	..	..	..	..	..	Fossil also Table Cape, Tasmania.
Terebra geniculata (Tate) *var.*	..	..	..	§	..	..	
Semicassis trinodosa (Tate)	..	..	..	..	..	..	
Drillia cochlearis (Tate) m.s.	..	..	..	..	..	..	New species.
Drillia wanganuiensis (Hutton)	..	..	..	..	..	..	Fossil Pareora and Wanganui Systems, New Zealand.
Drillia kalimnæ (Tate) m.s.	..	..	..	..	..	..	New species (*aff.* D. trevori).
Clathurella sp.	..	..	..	..	..	..	
Surcula sayceana (Tate) m.s.	..	..	..	..	..	..	New species.
Surcula pritchardi (Tate) m.s.	..	..	..	..	..	..	New species.
Surcula sp.	..	..	..	..	..	..	New species (*aff.* S. pritchardi).
Struthiolaria lirata (Tate)	..	..	..	..	..	..	
Pelicaria coronata (Tate)	..	..	..	§	§	..	
Pelicaria clathrata (Tate)	..	..	..	..	..	..	
Natica ovata (Hutton)	..	..	..	§	§	..	Fossil Wanganui and Pareora Systems, New Zealand.
Natica gibbosa (Hutton)	§	..	..	§	..	..	Fossil Wanganui System, New Zealand.
Natica hamiltonensis (T. Woods) ..	§	§	..	..	..	..	
Natica auriculata (Tate) m.s.	§	..	..	§	..	..	
Sigapatella undulata (Tate) m.s. ..	..	..	..	§	§	..	
Crepidula monoxyla (Lesson)	..	..	..	..	§	§	Living Victoria, New Zealand. Fossil Pareora and Wanganui Systems, New Zealand.
Crepidula immersa (Angas)	..	..	..	..	..	..	Living Victoria, South Australia.
Scalaria triplicata (Tate) m.s.	..	..	..	§	..	..	
Turritella acricula (Tate) m.s.	..	..	..	§	..	..	

Species found in Jemmy's Point Beds.	Eocene.			Miocene.		Pliocene.	Locality where Living, and Remarks.
	Lower Beds Muddy Creek.	Schnapper Pt.	S. Australia.	Upper Beds Muddy Creek.	S. Australia.	Limestone Creek, Glenelg.	
Gasteropoda—*Continued.*							
Turritella sp.	..	..	..	..	..	..	New species (*aff.* T· tristira).
Turritella sp.	..	..	..	..	..	..	New species (*aff.* T. tristira, *var.*)
Turritella sp.	..	..	..	ss	..	..	Not yet named.
Turritella platyspira (T. Woods)	..	s	..	ss	..	..	
Turritella murrayana (Tate)	..	..	s	..	..	..	
Cerithium sp.	..	..	..	..	..	..	
Cerithium sp.	..	..	..	..	..	..	
Rissoina bairnsdaleana (Tate) m.s.	..	..	..	..	..	..	New species.
Rissoa capistrata (Tate) m.s.	..	..	..	..	ss	..	
Leiopyrga cingulata (Tate) m.s.	..	..	..	s	ss	..	
Trochus sp.	..	..	..	..	..	..	
Bankivia maxima (Tate) m.s.	..	..	..	..	..	..	New species.
Ringicula lactea (Johnston) (?)	..	s	..	..	s	..	
Siphonaria diemenensis (Quoy)	..	..	..	..	..	s	Living Southern Australia.
Scaphopoda.							
Entalis mantelli (Zittel)	..	s	s	s	..	s	Fossil also Table Cape, Tasmania, and in New Zealand.
Lamellibranchiata.							
Barnea tiara (Tate)	..	..	..	s	..	..	
Saxicava arctica (Linn.)	..	s	..	s	s	..	Living Victoria, South Australia. Fossil New Zealand.
Panopaea australis (Sow.)	..	..	..	..	..	..	Living New South Wales, South Australia.
Corbula ephamilla (Tate)	..	s	s	s	s	..	

Species found in Jemmy's Point Beds.	Eocene.			Miocene.		Plio-cene.	Locality where Living, and Remarks.
	Lower Beds Muddy Creek.	Schnapper Pt.	S. Australia.	Upper Beds Muddy Creek.	S. Australia.	Limestone Creek, Glenelg.	
Lamellibranchiata—*Continued.*							
Corbula scaphoides (Hinds)	..	..	..	..	..	..	Living South Australia, New South Wales, North Australia, East Indies.
Myadora corrugata (Tate)	..	..	..	§	§	..	
Myadora brevis (Sow.)	..	§	..	§	§	..	Living South Australia, Tasmania, Queensland, New Zealand.
Myadora praelonga (Tate)	..	..	..	§	..	..	
Myadora tenuilirata (Tate)	§	§	..	§	§	..	
Myochama plana (Tate) m.s.	..	..	..	..	..	..	New species.
Mactra hamiltonensis (Tate)	..	..	..	§	..	..	
Tellina acqualatera (Tate)	..	..	§	§	..	..	
Tellina albinelloides (Tate)	..	..	..	§	..	..	
Tellina decussata (Lam.)	..	..	..	..	..	..	Living Southern Australia.
Zenatiopsis angustata (Tate)	..	..	§	§	..	§	Fossil also Table Cape, Tasmania.
Psammobia hamiltonensis (Tate) ..	..	..	..	§	..	..	Fossil also Table Cape, Tasmania.
Chione propinqua (T. Woods)	§	..	..	§	..	..	Fossil also Table Cape, Tasmania.
Chione subroborata (Tate)	..	..	..	§	§	..	Fossil also at Cheltenham.
Chione lineolata (Tate) m.s.	..	..	..	..	..	..	New species.
Cytherea submultistriata (Tate) ..	..	..	..	§	§	..	
Cytherea paucirugata (Tate)	..	..	..	§	..	..	
Dosinia grayii (Zittel)	..	..	..	..	§	..	Living Chatham Islands, Fossil Pareora and Wanganui Systems, New Zealand.
Chamostrea albida (Lam.)	..	..	..	§	..	..	Living Victoria, South Australia, New South Wales, New Zealand. Fossil also Table Cape, Tasmania.
Lucina quadrisulcata (D'Orbigny) ..	..	..	..	..	§	§	Living Southern Australia. Fossil Wanganui System, N.Z.

Species found in Jemmy's Point Beds.	Eocene.			Miocene.		Plio-cene.	Locality where Living, and Remarks.
	Lower Beds Muddy Creek.	Schnapper Pt.	S. Australia.	Upper Beds Muddy Creek.	S. Australia.	Limestone Creek, Glenelg.	
Lamellibranchiata—*Continued.*							
Kellia micaus (Tate)	..	..	..	§ §	§	..	
Crassatella oblonga (T. Woods)	..	..	..	..	§	..	Fossil also Table Cape, Tasmania.
Crassatella sp.	..	..	..	..	..	..	(*aff.* C. astartiformis).
Cardita spinulosa, (Tate)	..	..	..	..	..	..	
Cardita sp.	..	..	..	..	..	..	*var.* C. spinulosa, or new species.
Cardita trigonalis (Tate)	..	..	..	..	§	..	
Cardita sp.	..	..	..	..	..	..	
Mytilicardia sp.	..	..	..	..	..	..	New species.
Trigonia howitti (McCoy)	..	..	..	§	..	..	
Trigonia acuticostata (McCoy)	..	[a] ..	..	§ § §	§	§	Living Bass Strait. Fossil also at Cheltenham.
Nucula tumida (T. Woods)	..	..	§	§	..	..	Fossil also Table Cape, Tasmania.
Leda crassa (Hinds)	..	..	..	..	..	§	Living Southern Australia and Queensland.
Leda vagans (Tate)	..	§	§	§	..	..	
Leda sp.	..	..	..	..	..	..	(*aff.* L. woodsii).
Pectunculus cainozoicus (T. Woods)	..	§	..	§	..	..	
Pectunculus subtrigonalis (Tate)	..	..	..	§ § §	..	..	
Limopsis belcheri (Ad. and R.)	..	§ §	§	§ § § §	§	§	Living Victoria, South Australia, Cape of Good Hope.
Cucullaea corioensis (McCoy)	..	§ §	§	§ § § §	§	§	
Pecten antiaustralis (Tate)	..	..	..	§ § § §	§	..	
Pecten subconvexus (Tate)	..	..	..	§ § § §	..	..	
Pecten meringae (Tate) m.s.	..	..	..	. .	..	..	New species. [Zealand.
Placunanomia ione (Gray)	..	..	..	§	§	§	Living South Australia, Tasmania, New South Wales, New
Ostrea arenicola (Tate)	..	..	..	..	§ §	..	

Species found in Jemmy's Point Beds.	Eocene.			Miocene.		Plio-cene.	Locality where Living, and Remarks.
	Lower Beds Muddy Creek.	Schnapper Pt.	S. Australia.	Upper Beds Muddy Creek.	S. Australia.	Limestone Creek, Glenelg.	
Brachiopoda.							
Rhynconella baileyana (Tate)	..	..	..	..	..	..	
Polyzoa.							
Salenaria concinna (T. Woods)	§ §	§	..	..	§	..	Recent also.
Membranipora parvicella (T. Woods) ..	§ §	..	§	..	..	..	
Annulosa.							
Balanus trigonus (Darwin)	..	..	..	..		..	Living Australia, &c.
Balanus amaryllis (Darwin)	..	..	..	..	§	..	Living Australia, &c.
Annuloida.							
Arachnoides sp.	..	..	..	..	..	..	New species.
Cœlenterata.							
Flabellum victoriae (Duncan)	§	§	§	..	..	..	
Placotrochus deltoideus (Duncan) ..	§	§ §	§ §	§	..	§	
Sphenotrochus australis (Duncan) ..	§	§	§ §	..	..	..	Specimen much worn.

The species of six molluscs in the above list is doubtful, owing to the badly preserved state of the specimens, and the remarks which follow refer only to the remaining 110 species. The number of new species gathered by us was 24, which with 8 others previously discovered by Mr. Gregson, makes a total of 32 new species from these beds. Of the 110 species, 91 are extinct, and 19 are still living. In estimating the age of the deposit by the percentage system of Lyell, it is, of course, allowable to reckon only the Mollusca proper, and therefore, the 8 species at the bottom of the list will be neglected. We thus have 86 extinct, and 16 living species of Mollusca available for calculation. The following is a summary of their distribution in time :—

Extinct Species—		
Ranging from Eocene to Pliocene	3	species
,, Eocene to Miocene	12	,,
,, Miocene to Pliocene	2	,,
Recorded from Eocene strata only	4	,,
,, Miocene ,, ...	33	,,
Restricted to Jemmy's Point beds	32	,,
Living Species—		
Ranging from Eocene to present time	3	,,
,, Miocene ,, ...	8	,,
Restricted (as fossils) to Jemmy's Point beds ..	5	,,
Total ..	102	

The terms Eocene, Miocene, and Pliocene, are used merely to indicate the relative ages of our various tertiary deposits, as shown by the percentage of recent shells contained in them, and not to imply synchronism with strata so named in Europe. The percentage system of determining the horizon of a bed is, of course, as applicable to the Australian tertiaries as to those in other parts of the world. The Molluscan faunas of Schnapper Point, Jan Juc, Muddy Creek, and the Murray cliffs, are as rich as those from the Paris and Vienna basins, and will afford to the patient collector ample materials for their subdivision into well defined groups. The argument for the percentage method of classifying tertiary strata is very clearly stated by Professor Hutton in an article upon the Wanganui System of New Zealand, from which I quote the following remarks :—

"The value of taking the recent species of Mollusca in a tertiary rock, as a test of its relative age, has sometimes

been called in question. This has arisen, I think, from a misconception of the limits of the method. If it be true that species have gradually changed, or that they have been gradually introduced into an area—which no one doubts—then it must be true that, in each epoch, the nearer we approach to the present time, the nearer must be the resemblance between the fauna of the epoch and that of the present time. Indeed, the same holds good if, instead of assuming gradual change, we assume that the ancient fauna was altered by successive migrations into the area; for it is evident that the percentage test would be of great value here in ascertaining the relative ages of the various migrations; for each migration would bring many species similar to or allied to those now living, consequently the percentage system is of the greatest importance in testing the relative ages of any two sets of beds belonging to the same biological province. But it does not follow that this method can be trusted for correlating with accuracy sets of beds in widely distant areas. On the contrary, different districts have undergone different physical changes, and we have therefore every reason to suppose that alterations in floras and faunas would proceed with unequal rapidity in different parts of the world."*

It was stated above that out of 102 species of Mollusca in the Jemmy's Point beds, 16 are living, which is within a fraction of 16 per cent., and the beds may therefore be confidently referred to the Miocene period. Many more species will, I hope, yet be obtained from the strata; but, judging from the similarity of the gatherings by the members of our party, as well as by Mr. Gregson, this proportion is not likely to be materially altered.

Only one other deposit in Victoria has, so far, been definitely classed as Miocene, viz., the upper beds at Muddy Creek. In South Australia, the oyster beds of the Murray cliffs and elsewhere, are also referred to the same epoch. In both of these, the percentage of recent shells, as calculated from the described forms, is not more than half that given for the Jemmy's Point fossils; but with regard to the Muddy Creek fauna, when the work of naming all the species obtained is completed, the proportion will, I think, be slightly raised. The tertiaries of Australia are perhaps not

* "The Wanganui System," by Captain F. W. Hutton, F.G.S., "Transactions New Zealand Institute" 1885.

sufficiently explored to enable us to make definite subdivisions of the principal groups, but from its high proportion of recent shells, the Jemmy's Point deposit is, undoubtedly, the youngest member of our marine Miocene group yet met with.

There is certainly a strong likeness between the Jemmy's Point and the upper Muddy Creek beds. Out of the 102 Molluscan forms gathered from the former, no less than 47 are found in the latter also. From the South Australian localities we get 10 additional species, making 56 per cent. of shells common to Jemmy's Point, and the other recognised Miocene beds.

In the lower or Eocene* zone of Muddy Creek, which has yielded about 450 species of mollusca, only 16 of the Jemmy's Point fossils are found, and the majority of these are widely distributed shells, and common to the Eocene and Miocene throughout Australia.

At Muddy Creek, the Eocene and Miocene beds are in contact, a circumstance which prevented their distinct character being recognised until lately; but at Jemmy's Point it is of especial interest to note that the Miocene deposit is the only one present.

The Jemmy's Point beds are of course quite separate from the calcareous strata of the Glenelg River, Portland Bay, Jan Juc, Bairnsdale, &c., which are commonly, but I think erroneously, regarded as Miocene by our geologists. In an article read before the Australasian Association this year, I gave my reasons for placing these in the Lower Tertiary or Eocene group. They have been known as Miocene so long, and have been quoted as such in so many geological memoirs, both Australian and European, that it seems almost presumptuous to call in question the correctness of the classification.

* A confirmation of the opinion expressed by Professor Tate and myself as to the Eocene age of the lower Muddy Creek beds, and their equivalents in South Australia, has recently appeared from the pen of M. Cossman, a Parisian specialist in the Department of Tertiary Gastropods. In reviewing Parts I and II of Professor Tate's "Older Tertiary Gasteropoda," in *L'Annuaire de Geologie Universelle*, Paris 1889, M. Cossman says—"This fauna has an incontestable analogy with that of the Paris basin. M. Tate will probably give us this year a continuation of his grand work; we should see with pleasure this savant establish more frequent affinities with the European species, and with those of the Alabama basin. It is incontestable that the Australian fauna, if it does not contain species in common with these two faunas, occupies at the least a sort of middle place between these deposits, which are so widely separated geographically."

During the last ten or twelve years, however, the data necessary for determining the relative ages of our tertiary deposits have largely increased. An extensive suite of fossils has been collected, not only from the arenaceous and argillaceous, but also from the calcareous beds; added to which, some most important stratigraphical observations have been made on the sequence of the strata by Professor Tate and others. The conclusion to be drawn from the accumulated weight of evidence is, that the calcareous strata to which I have alluded must be referred to the Eocene, and not, as has hitherto been the case, to the Miocene epoch.

In the course of our trip to the Gippsland Lakes, we stayed for some hours at Bairnsdale, and took the opportunity of visiting the fossiliferous section on the banks of the River Mitchell, a few miles from the town. The fossils are contained in a hard calciferous rock, and are extracted with difficulty. During the time at our disposal, we were able to distinguish only twenty-three species, but I trust that, before long, some local geologist will recognise the fine opportunity there is here for collecting, and add largely to this number. I give a list of the fossils obtained, principally for the sake of comparison with those from the neighbouring bed at Jemmy's Point:—

Waldheimia garibaldiana.
Waldheimia insolita.
Waldheimia grandis.
Waldheimia tateana.
Magasella compta.
Ostrea hyotis (?)
Dimya dissimilis.
Pecten gambierensis.
Pecten sturtianus.
Pecten semilævis.
Hinnites corioensis.
Lima bassii.
Lima jeffreysiana.
Spondylus pseudoradula.
Spondylus gæderopoides.
Cucullæa corioensis.
Conus (cast).
Trochus (cast).
Cellepora fossa.
Clypeaster gippslandicus.
Leiocidaris australis.
Deltocyathus viola.
Orbulina, sp.

The only species common to this list, and that given for Jemmy's Point, is *Cucullæa corioensis* which, though most abundant in the Eocene, has yet been found in every part of the tertiary series, from Eocene to Pliocene. Possibly, with further research, a few other shells common to both deposits may occur, but, judging from my experience with similar strata in the west of the colony, the proportion will remain small.

On the other hand, sixteen out of the nineteen species, which are sufficiently well preserved to receive distinctive names, occur also in the Eocene blue clays of Muddy Creek,

the missing ones being *Pecten gambierensis*, *Hinnites corioensis*, and *Spondylus gœderopoides*. The last two, however, are recorded from equivalent strata in South Australia, while the remaining one is a common shell at Mt. Gambier, and in the Glenelg cliffs.

With such a small number of species, the percentage system of testing the age of the Bairnsdale deposit cannot, of course, be applied, but we are certainly on safe ground in classing it with those beds wherein all, or nearly all, its shells are represented, namely, with the Eocene of Muddy Creek and South Australia.